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IS 2794 (1979): Truing/Dressing Tools, Single Diamond [PGD 9: Abrasives]

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IS : 2794 - 1979

(Reaffirmed 2001)

Indian Standard

SPECIFICATION FOR TRUING/DRESSING TOOLS, SINGLE DIAMOND

(First Revision)

1. Scope — Covers the dimensions and requirements for truing/dressing tools with single diamond for truing/dressing grinding wheels.

1.1 The recommendations for the guidance of users in the selection, use and care of diamond truing tools are given in Appendix A.

1.2 The method of finding out the correct metric carat weight of the diamond required for a particular grinding wheel is given in Appendix B.

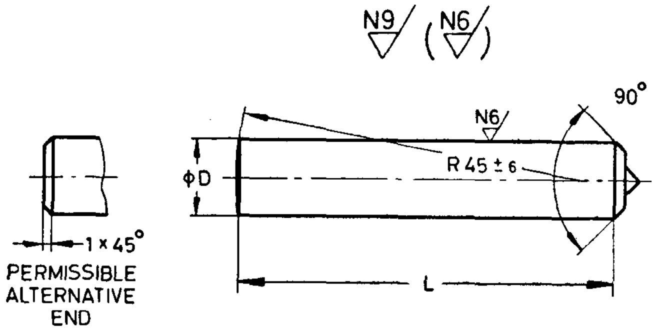
2. Dimensions

2.1 *Parallel Shank Tools*

2.1.1 The dimensions of truing tools with parallel shank and their diamond weight ranges shall be as given in Table 1.

TABLE 1 DIMENSIONS FOR TRUING TOOLS WITH PARALLEL SHANK

All dimensions in millimetres.



Nominal Size *D* h11	*L*		Weight Range of Diamond in Metric Carat*	
	Hand Operated	Machine Operated	*Min*	*Max*
6·0	150	50	0·10	0·40
8·0	150	50	0·20	0·75
10·0	150	50	0·30	1·5
12·0	150	150	0·50	3·0
16·0	150	150	0·50	5·0

*1 metric carat = 0·200 g

Designation: A single diamond truing tool with parallel shank having nominal size D = 10·0 mm, diamond of weight range 1·5 carat and conforming to this standard, shall be designated as:

Truing Tool, Parallel Shank 10·0 × 1·5 IS : 2794

Adopted 30 October 1979 | © March 1980, ISI | [redacted] Gr 4

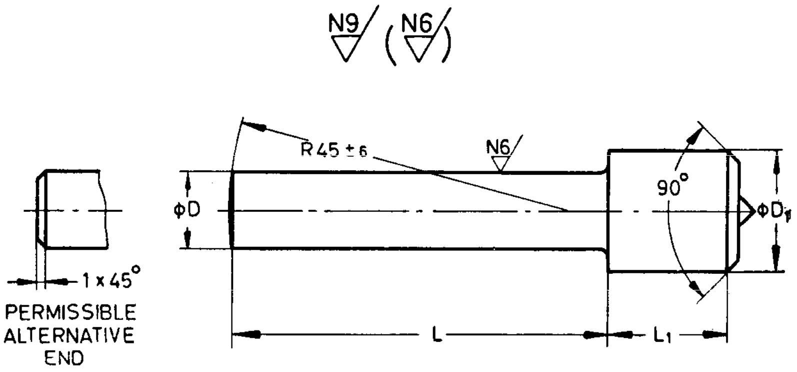
INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Abrasives Sectional Committee, EDC 13; Industrial Diamond and Super Abrasive Subcommittee, EDC 13 : 3 [Ref : Doc : EDC 13 (3039)]

2.1.2 The dimensions of truing tools with parallel shank and head, and their diamond weight ranges shall be as given in Table 2. Parallel shank with a head shall be used when the diameter of the shank is not enough to accommodate the required diamond.

TABLE 2 DIMENSIONS FOR TRUING TOOLS WITH PARALLEL SHANK WITH HEAD

All dimensions in millimetres.



Nominal Size ***D*** **h11**	***L***		***D***$_1$	***L***$_1$	**Weight Range of Diamond in Metric Carat***	
	Hand Operated	Machine Operated			*Min*	*Max*
6·0 8·0 10·0	150	50	12·50	12·50	0·25	3·0
10·0 12·0	150	50	16·00	16·00	0·50	5·0

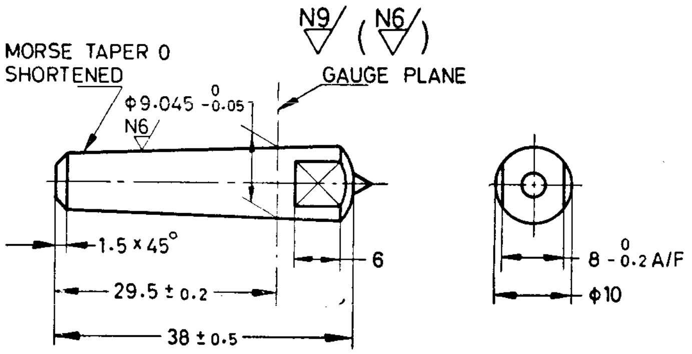
*1 metric carat = 0·200 g

Designation: A single diamond truing tool with parallel shank with head having nominal size $D = 10{\cdot}0$ mm, diamond of weight range 3·0 carat and conforming to this standard shall be designated as:

Truing Tool, Parallel Shank with Head 10·0 × 3·0 IS : 2794

2.2 *Taper Shank Tools*

2.2.1 The dimensions of truing tools with morse taper shank and their diamond weight ranges shall be as given in Fig. 1 and 2.

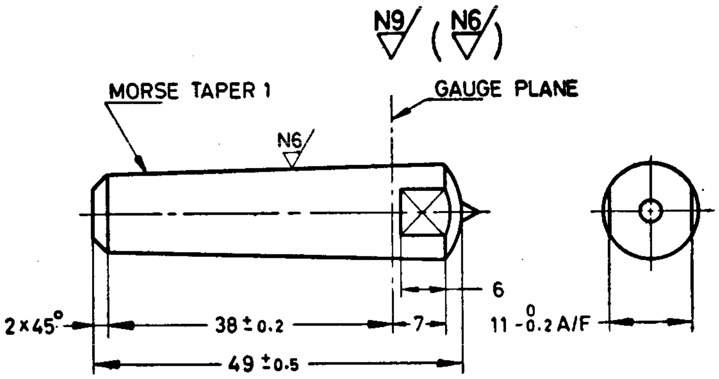


Weight range of diamond = 0·2 to 2·0 metric carat

FIG. 1 DIAMOND TRUING TOOL WITH 'MORSE TAPER 0' SHANK

Designation : A single diamond truing tool with 'morse taper 0' shank having the dimensions as given in Fig. 1 and conforming to this standard shall be designated as:

Truing Tool, 'Morse 0' IS : 2794



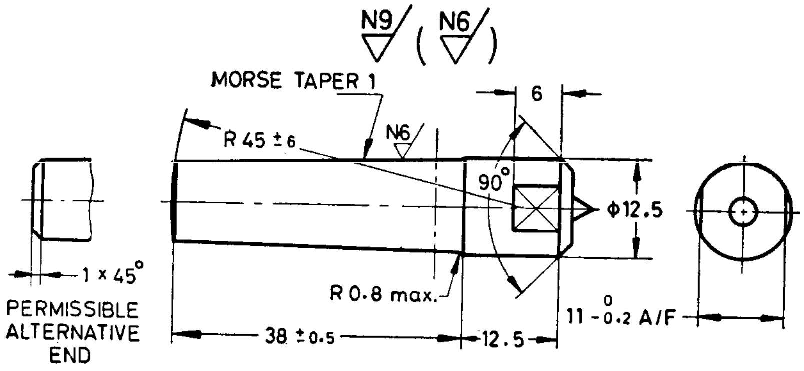
Weight range of diamond = 0·2 to 2·0 metric carat

FIG. 2 DIAMOND TRUING TOOL WITH 'MORSE TAPER 1' SHANK

Designation : A single diamond truing tool with 'morse taper 1' shank having the dimensions as given in Fig. 2 and conforming to this standard shall be designated as:

Truing Tool, 'Morse 1' IS : 2794

2.2.2 The dimensions of truing tools with morse taper shank with head and their diamond weight ranges shall be as given in Fig. 3.



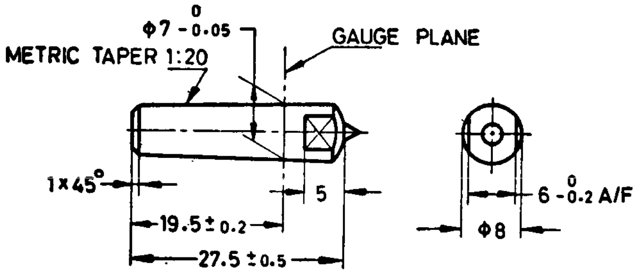
Weight range of diamond = 0·2 to 2·0 metric carat

FIG. 3 DIAMOND TRUING TOOL WITH 'MORSE TAPER 1' SHANK WITH HEAD

Designation: A single diamond truing tool with 'morse taper 1' shank with head having dimensions as given in Fig. 3 and conforming to this standard shall be designated as:

Truing Tool, 'Morse 1' with Head IS : 2794

2.2.3 The dimensions of truing tools with metric taper shank and their diamond weight ranges shall be as given in Fig. 4.



Weight range of diamond = 0·2 to 2·0 metric carat

FIG. 4 DIAMOND TRUING TOOL WITH 'METRIC TAPER 1 : 20' SHANK

Designation: A single diamond truing tool with 'metric taper 1 : 20' shank having the dimensions as given in Fig. 4 and conforming to this standard shall be designated as:

Truing Tool, 'Metric 1 : 20' IS : 2794

3. Material

Shank Portion	—	Carbon steel of tensile strength not less than 700 MPa*
Tip	—	Diamond of weight range as specified in **2.1** and **2.2**.

4. General Requirements

4.1 The dimensions of morse taper shanks and metric taper shanks shall be in accordance with IS : 1715-1973 'Dimensions for self-holding tapers'.

5. Diamond Grade and Permissible Variation of Weight

5.1 The grade of diamond used for diamond dressers shall conform to either of the following three grades:

Grade I — Diamond having 3 to 5 well defined natural points,

Grade II — Diamond having 2 to 3 well defined natural points, and

Grade III — Diamond having 1 to 2 well defined natural points.

5.2 The permissible weight variation of diamonds used shall be as given in Table 3.

6. Designation

6.1 The designation of a diamond truing tool shall indicate:

a) Commonly used name,
b) Nominal size,
c) Nominal weight of diamond in carats,
d) Diamond grade, and
e) Number of this standard.

TABLE 3 DIAMOND SIZE RANGE AND WEIGHT TOLERANCES

(*Clause* 5.2)

Nominal Weight* Metric Carats	**Acceptable Range*** Metric Carats
0·20	0·18 — 0·22
0·25	0·23 — 0·30
0·35	0·31 — 0·42
0·50	0·43 — 0·63
0·75	0·64 — 0·87
1·00	0·88 — 1·12
1·25	1·13 — 1·37
1·50	1·38 — 1·63
1·75	1·64 — 1·84
2·00	1·85 — 2·12
2·50	2·13 — 2·65
3·00	2·66 — 3·25
3·50	3·26 — 3·65
4·00	3·66 — 4·25
4·50	4·26 — 4·65
5·00	4·66 — 5·25

*1 metric carat = 0·200 g

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*1 MPa = 0·1 kgf/mm^2.

6.1.1 The examples of designation of different types of tools are given in relevant tables and figures.

7. Workmanship and Finish

7.1 Diamond shall be sintered into a steel shank in a suitable metal matrix having good diamond holding properties at a temperature below 750°C to prevent oxidation of diamond.

7.2 Brazing of diamond to the steel shank is not permitted as diamond will crack/oxidize at high temperatures. All diamond points shall be natural and bruting of points is not permitted.

8. Marking

8.1 Each tool shall be marked with the following information:

a) Nominal size,
b) Nominal weight of diamond in carats,
c) Diamond grade,
d) Manufacturer's serial number, and
e) Manufacturer's name or trade-mark.

8.2 *ISI Certification Marking* — Details available with the Indian Standards Institution.

9. Protection and Packing

9.1 The diamond truing/dressing tools shall be packed securely in suitable containers with suitable cushioning material to prevent movement of each tool within the containers and adequately cased, so that the tool is capable of withstanding normal transit risks. The diamond portion of the tool shall be suitably protected.

APPENDIX A

(*Clause* 1.1)

RECOMMENDATIONS FOR THE GUIDANCE OF USERS IN THE SELECTION, USE AND CARE OF DIAMOND TRUING TOOLS

A-1. Tolerances for Sockets for Truing Tools

A-1.1 The tolerance for the bores of sockets into which the parallel shanks of diamond truing tools are fitted is recommended to be H7.

A-2. Selection of Diamond Truing

A-2.1 For a proper selection of diamond truing tools the following variables should be taken into consideration:

a) *Grinding wheel variables*
    i) Type of abrasive,
    ii) Grain size,
    ii) Grade,
    iv) Type of bond, and
    v) Diameter and width of face.

b) *Diamond variables*

  i) Diamond grade,
  ii) Size, and
  iii) Shape.

c) *Operating variables*

  i) Angle of presentation,
  ii) Wet or dry truing,
  iii) Depth of cut and rate of feed (traverse),
  iv) Peripheral speed of wheel,
  v) Type of material being ground and degree of finish required,
  vi) Whether plain or form grinding,
  vii) Type of general condition of machine, and
  viii) Operator's skill.

A-2.1.1 It is recommended that the users should consult the manufacturer regarding correlation of these variable factors and guidance for a proper selection of truing tools.

A-3. Recommendations for Use and Core of Diamond Truing Tools

A-3.1 The attention of the users is drawn to the following while using diamond truing tools:

a) *Correct wheel balance*;

b) *Rigidity of mounting*;

c) *Angle of presentation* — The diamond shall be presented to the wheel in a trailing attitude. The angle between the axis of the truing tool holder and a line drawn through the centre of the grinding wheel and the point of contact in the periphery shall be 5° and 15° (*see* Fig. 5);

d) *Cutting edge* — The cutting edge of the diamond shall be on the centre line of the grinding wheel at the point of contact;

e) *Depth of cut* — The depth of cut in general shall not exceed 0·05 mm;

f) *Adequacy of coolant system, where used* — It is essential that the coolant shall be turned on before the diamond makes contact with the wheel. In case the diamond is accidently over-heated, it shall not be quenched, as this may cause the diamond to shatter.

g) *Adequate machine maintenance*;

h) *Systematic rotation of tool and regular inspection* — To ensure withdrawal from use in sufficient time to permit economic servicing;

j) *Re-classification of diamonds after servicing* — In the light of the operating variables given in **A-2.1**; and

k) *Sharpening of diamonds* — To help in sharpening all the diamonds and to avoid marks on the wheel face, the canting of the diamond tools shall be at an angle of 30° with the plane of the wheel (*see* Fig. 5). This method is not applicable while dressing internal grinding wheels.

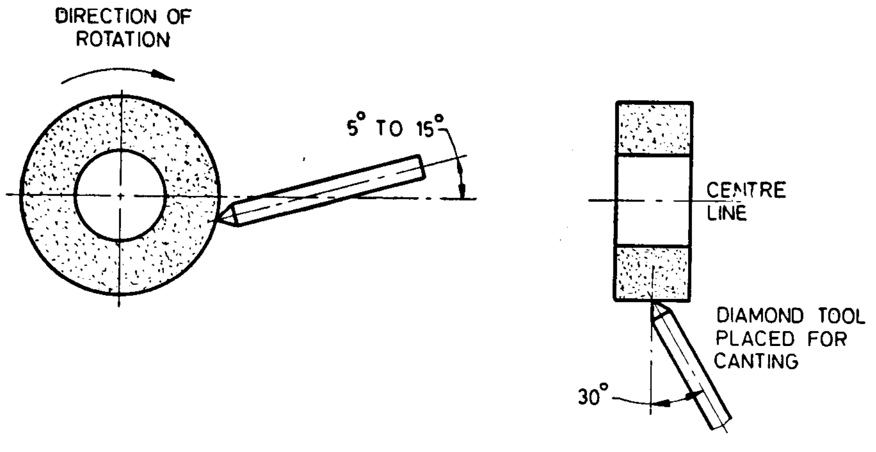

FIG. 5 RANGE OF ANGLE OF PRESENTATION OF TOOL

A-4. Tool Holder

A-4.1 For diamond truing tools with morse/metric taper, tapered tool holder is the most suitable one. The tool when fitted in this holder does not get loosened by vibration and remains stable.

A-4.2 The morse/metric taper bore of the holder shall be free from scratches, dents or damages to ensure positive grip on the truing tool.

APPENDIX B

(*Clause* 1.2)

METHOD OF FINDING OUT THE CORRECT METRIC CARAT WEIGHT OF THE DIAMOND REQUIRED FOR A PARTICULAR GRINDING WHEEL

B-1. The formula to calculate the correct carat weight of the diamond required is given below:

$$\alpha = \frac{D + 2\,W}{254}$$

where

α = weight of the diamond required in carats;

D = diameter of grinding wheel, in mm; and

W = width of grinding wheel, in mm.

Example:

For a grinding wheel having diameter = 900 mm and width = 58 mm, the weight of the required diamond should be:

$$\frac{900 + (2 \times 58)}{254} \doteq 4 \text{ carats}$$

B-2. The above is one of the many empirical formulae allowing selection of a diamond of a suitable carat weight in relation to the grinding wheel being dressed.

B-2.1 None of these formulae can be justified on analytical grounds and the most suitable is probably the one easiest to remember and to apply.

B-2.2 Very elaborate empirical formulae have been devised, taking into account the following characteristics:

a) Diameter of grinding wheel,
b) Width of grinding wheel,
c) Type of abrasive,
d) Grit size of abrasive,
e) Wheel bond,
f) Wheel hardness, and
g) Diamond quality.

B-2.2.1 These more elaborate formulae have the advantage that they draw people's attention to the influence of these factors, but have the disadvantage that they cause additional work and fall into disuse by neglect.

B-3. The nomogram may be used in lieu of the formulae given under **B-1** for finding out the correct metric carat weight of the diamond required for a particular grinding wheel (*see* Fig. 6).

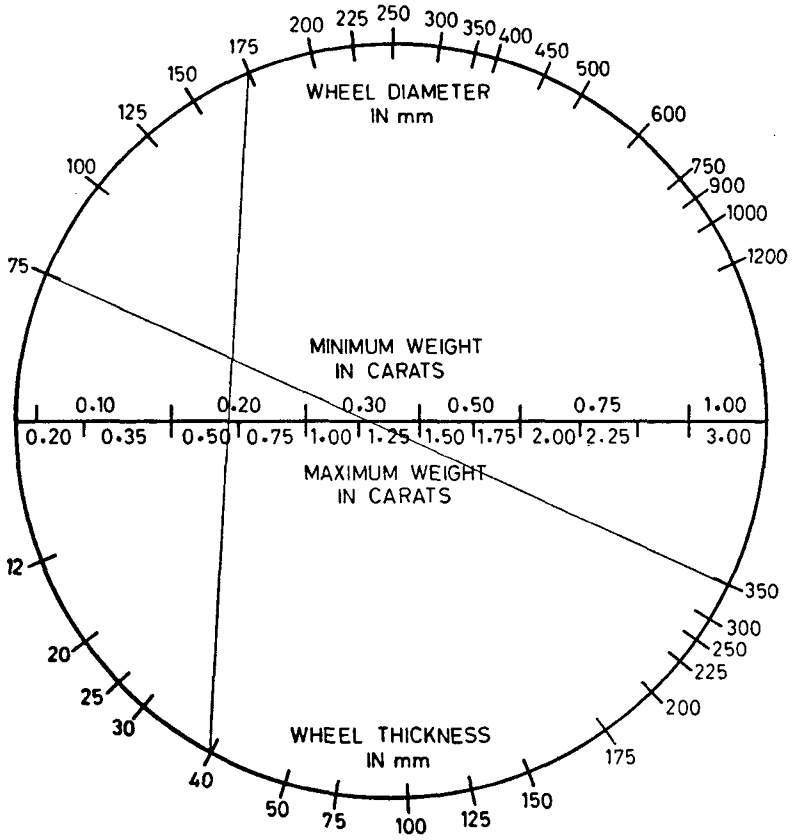

FIG. 6 NOMOGRAM

EXPLANATORY NOTE

This standard was first published by the Small Tools Sectional Committee, EDC 45, in 1964, in response to the request from manufacturers and users for providing a uniform system of processing diamond truing tools. This standard was later on transferred to the Abrasives Sectional Committee as it related to the work looked after by it. This standard is being revised so as to bring it in line with the various practices followed in the industry. In this revision the following additions have been made:

a) Truing tools with metric taper shank;

b) Material;

c) The diamond grade and the permissible variation in the weight of diamond; and

d) The method of finding out the correct metric carat weight of the diamond required for a particular grinding wheel.

Truing/dressing tools which have a diamond tip are used for truing/dressing the grinding wheel when the grinding surface has been worn out. The diamond truing tools may have a single diamond or several diamonds set in a suitable pattern which may be presented to the grinding wheel for dressing it. In this standard only the truing tools having a single diamond have been covered.

In the preparation of this standard, considerable assistance has been derived from BS : 2002-1973 'Dimensions for Diamond Truing Tools' issued by the British Standards Institution.

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